the apparatus at least to limit overall resources to avoid exceeding a maximum number of resources configured by an access point.

[0019] An apparatus, according to certain embodiments, includes selecting means for selecting, by a user equipment, resources according to a prioritized resource list. The apparatus also includes limiting means for limiting overall resources to avoid exceeding a maximum number of resources configured by an access point.

[0020] A non-transitory computer-readable medium is, according to certain embodiments, encoded with instructions that, when executed in hardware, perform a process. The process includes selecting, by a user equipment, resources according to a prioritized resource list. The process also includes limiting overall resources to avoid exceeding a maximum number of resources configured by an access point.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] For proper understanding of the invention, reference should be made to the accompanying drawings, wherein:

[0022] FIG. **1** illustrates an architecture of LTE-LAN.

[0023] FIG. **2** illustrates contention free uplink transmission.

[0024] FIG. **3** illustrates contention based uplink transmission according to certain embodiments.

[0025] FIG. **4** illustrates multiple contention based uplink transmission according to certain embodiments.

[0026] FIG. **5** illustrates contention based transmission without a channel corresponding to PUCCH, according to certain embodiments.

[0027] FIG. **6** illustrates resource allocation for contention based PUSCH, according to certain embodiments.

[0028] FIG. **7** illustrates resource allocation for C-PUSCH, according to certain embodiments.

[0029] FIG. **8** illustrates resource allocation for contention based transmission with initial transmission and re-transmission, according to certain embodiments.

[0030] FIG. **9** illustrates a method according to certain embodiments.

[0031] FIG. **10** illustrates another method according to certain embodiments.

[0032] FIG. **11** illustrates a further method according to certain embodiments.

[0033] FIG. **12** illustrates a method according to certain embodiments.

[0034] FIG. **13** illustrates yet a further method according to certain embodiments.

[0035] FIG. **14** illustrates a system according to certain embodiments.

[0036] FIG. **15** illustrates a method according to certain embodiments.

DETAILED DESCRIPTION

[0037] Long term evolution local area network (LTE-LAN) may provide very high speed data transmission for local area coverage, such as indoor, residential and enterprise scenarios. FIG. **1** illustrates an architecture of LTE-LAN. The LTE-LAN access point (AP) can provide LTE-based wireless connections to local area devices. The mobile terminals working in this local area network can establish radio connections with the LTE-LAN AP.

[0038] In an LTE-based local area network, orthogonal frequency-division Multiple Access (OFDMA) may be used in uplink transmission. In LTE-LAN, uplink (UL) peak to average power ratio (PAPR) may not be an important issue due to transmission (Tx) power of the user equipment (UE) being almost equal to that of the eNode B (eNB) and UL signal to interference and noise ratio (SINR) distribution being very close to downlink (DL) SINR distribution. Besides, OFDMA for UL in local area network may have several benefits compared to single carrier frequency division multiple access (SC-FDMA), more flexible resource allocation, UL/DL similarity for device to device (D2D) case, similar UL/DL structure for interference-aware cancellation design especially for dynamic time division duplex (TDD) UL/DL configuration switching, and same radio chip applicable for both UE and LAN AP.

[0039] Therefore, certain embodiments provide for the UL control channel to be redesigned for local area network as well as UL scheduling procedure due to OFDMA applicable for UL transmission. The UE may be configured with a new UL control channel or UL signaling procedure, which may be more appropriate for a local area network.

[0040] Uplink transmission methods may be categorized as contention-free or contention-based. Contention free UL transmission is currently adopted for data transmission in 3GPP LTE. FIG. **2** illustrates contention free uplink transmission. In detail, when a UE has uplink data available in the UE's logic buffer, it may request uplink resource for data transmission. The UE may send the scheduling request (SR) by physical uplink control channel (PUCCH) format 1 or physical random access channel (PRACH) for the contention-based uplink resource request if certain conditions for the SR are fulfilled. According to a certain scheduling policy, the eNB may allocate some physical uplink shared channel (PUSCH) resources for sending buffer status report (BSR) by means of UL grant to the UE. Then the UE may transmit the amount of data available in the logic buffer on a scheduled PUSCH to the eNB for UL scheduling. After receiving this BSR, the eNB may allocate corresponding UL resource(s) by means of an UL grant to the UE for data transmission, taking the uplink radio condition between the UE and the eNB into account. This signaling between the UE and the eNB may be complicated and may contribute to latency. TDD is a major duplexing technology in local area. Thus, sometimes the UL transmission procedures as shown in FIG. **2** will generate large latency. For example, in DL heavy TDD frame configuration is configured, for example, TDD configuration **5**, the procedures in FIG. **2** may need at least 20 ms to obtain UL grant for requested UL transmission Therefore, contention based UL transmission is one method to decrease the latency. For contention based UL transmission, the scheduling request is not needed any more. Moreover, UL grant and BSR may also be saved.

[0041] In the current LTE specification, the UL data transmission is controlled by the eNB. Thus, for example, the eNB may send an UL grant to indicate to UE the resource and MCS to transmit data. However, for contention based UL data transmission, if no UL grant is sent to UE, the eNB may have no knowledge of the information, such as the resources, MCS of data transmission, and the like, that will be used by the UE. It may be hard for the eNB to detect such information. One approach to be used may be blind decoding, which means that the eNB may try every possible resource allocation and MCS combinations. Due to lack of a priori knowledge, it may be practically an impossible task for the eNB to perform such a detection.